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National
Aeronautics and
Space
Administration

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Announcement of Opportunity

ORIGINAL

COMPLETED

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Mars Observer Mission

Notice of intent due: May 3, 1985

Proposals due: August 2, 1985

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MARS OBSERVER MISSION

SCHEDULE OF EVENTS

1985

May 3	Deadline for Notices of Intent
May 23	Pre-Proposal Briefing, Pasadena, CA
August 2	Deadline for Receipt of Proposals
September- December	Peer Review of Proposals Completion of Technical and Cost Reviews Categorization of Proposals Preparation of Payload Recommendation
November	Selection of Mars Observer Spacecraft

1986

January	Evaluation of Payload Recommendation by SSASC
February	Tentative Selection of Investigations Formation of PSG
March- August	Investigation Accommodation Phase
September	Preparation of Final Payload Recommendation
November	Final Selection of Investigations

SCHEDULE (continued)

1987

January Preliminary Design Review

1990

August- Launch
September

1991

August Arrival at Mars

1993

September End of Nominal Mission

1994

May Final Summary Science Reports Due

SUMMARY OF MARS OBSERVER MISSION

MISSION GOALS

To make observations that will enhance our understanding of the geosciences and climatology of Mars, specifically:

- o determine the global elemental and mineralogical character of the surface material.
- o define globally the topography and the gravitational field.
- o establish the nature of the magnetic field.
- o determine the time and space distribution, abundance, sources, and sinks of volatile material and dust over a seasonal cycle.
- o explore the structure and aspects of the circulation of the atmosphere.

SPACECRAFT

Single spacecraft, to be selected. Will be modified Earth-orbital type. Nadir-oriented. No instrument scan platform.

LAUNCH VEHICLE

Space Shuttle and appropriate upper stage.

PAYLOAD CHARACTERISTICS

Mass:	85 kg.
Power:	91 watts.
Communications:	X-band uplink and downlink.
Data recording rates:	1.5, 3.0, 6.0, 12.0 Kbps.
Data storage capacity:	24 hrs. at 6 Kbps.
Playback data rate:	maximum 32 Kbps.

Candidate Facility Instruments:

- Gamma-Ray Spectrometer (GRS)
- Visual and Infrared Mapping Spectrometer (VIMS)
- Spacecraft Telecommunications System (TCS)

SUMMARY (continued)

MISSION PROFILE

Launch opportunity: August-September, 1990

Arrival at Mars: August 1991

Initial transitional orbit period: up to 80 days

Final Orbit: low-altitude (average 361 km)
near-polar (93° inclination to equator)
sun-synchronous (2 P.M. local time)

Mission Duration (after transition period): one Mars year
(687 days) (approximately October 1991 - September 1993).

TYPES OF PROPOSALS REQUESTED BY THIS ANNOUNCEMENT

- (1) Principal Investigator/Instrument
- (2) Facility Instrument (Team Leader or Team Member)
- (3) Interdisciplinary Scientist

LIST OF ABBREVIATIONS

AO	Announcement of Opportunity.
Co-I	Co-Investigator on PI/Instrument Investigation.
COMPLEX	Committee on Planetary and Lunar Exploration (Space Science Board, National Academy of Sciences).
DSN	Deep Space Network. The system for communicating with the spacecraft. Operated by JPL.
GRS	Gamma-Ray Spectrometer. A candidate Facility Instrument.
IDS	Interdisciplinary Scientist.
IDT	Instrument Development Team. For Facility Instruments.
JPL	The Jet Propulsion Laboratory, Pasadena, CA. The NASA contractor that will manage the Mars Observer mission.
Kbps	Kilobits per second. A data transmission rate.
NASA	National Aeronautics and Space Administration.
PI	Principal Investigator on a PI/Instrument Investigation.
PIDDP	Planetary Instrument Definition and Development Program.
PS	Participating Scientist.
PSG	Project Science Group.
SEDR	Supplementary Experiment Data Record. Data supplied by JPL to investigators.
SSASC	Space Science and Applications Steering Committee. A NASA committee to consider and categorize proposals.
SSEC	Solar System Exploration Committee. A committee of the NASA Advisory Council.
TCS	Spacecraft Telecommunications System. May be operated as a Facility Instrument.
TL	Team Leader of a Facility Instrument Team.
TM	Team Member of a Facility Instrument Team.
VIMS	Visual and Infrared Mapping Spectrometer. A candidate Facility Instrument.

ANNOUNCEMENT OF OPPORTUNITY

FOR THE

MARS OBSERVER MISSION

AO No. OSSA-2-85

April 8, 1985

I. DESCRIPTION OF THE OPPORTUNITY

A. INTRODUCTION

The National Aeronautics and Space Administration (NASA) announces the opportunity to propose scientific investigations utilizing an unmanned Mars orbital mission, the Mars Observer. The primary objective of the Mars Observer mission will be to make observations that will enhance our understanding of the geosciences and climatology of Mars. Development of the Mars Observer Project was initiated in FY 1985. The program will be implemented with the launch of a single spacecraft to Mars in 1990, using the Space Shuttle and an appropriate upper stage launch vehicle. The Mars Observer spacecraft will reach Mars in August 1991, and detailed observations of the planet will be conducted from a low-altitude, near-polar, mapping orbit for a period of one Mars year (687 days), from approximately October 1991 to September 1993.

Following the strategy developed by the Solar System Exploration Committee (SSEC) for implementing relatively low-cost missions to explore the inner solar system, the Mars Observer spacecraft will be an adaptation of an existing Earth-orbital spacecraft design. The science instruments will, therefore, be constrained to fit within the envelope of mass, volume, power, data rate, spacecraft control and stability, viewing capabilities, magnetic cleanliness, and other constraints imposed by the characteristics of the selected spacecraft. There will be no scan platform on the spacecraft. Instruments that require multiple view directions must have multiple viewing ports or must be provided with articulation within the instrument.

Detailed information on spacecraft constraints (see Section V) will be provided in Volume VII of the Proposal Information Package. This Package is a set of documents (see Section VII.B for details) which will be sent to all those responding to this Announcement of Opportunity (AO) with a Notice of Intent to propose for the Mars Observer mission.

The Mars Observer is envisioned as the first in a series of innovative, low-cost missions to study objects in the inner solar system--certain inner planets, comets, and asteroids. Each

mission will address only a limited set of scientific objectives, and mission operations will be simplified in comparison to previous solar system exploration missions.

The goal of the Mars Observer project is to carry out a mission with high scientific return and wide scientific participation at relatively modest cost. The attainment of high scientific return on the Mars Observer mission, which will involve repetitive mapping with complementary science instruments, will require a carefully planned sharing of spacecraft resources as well as the final reduced data sets. Cost constraints will require, among other things, strict limits on the number and participation of science team members (see Section V.C). This approach is reflected in the project planning and by special provisions in this AO.

B. TYPES OF PROPOSALS

This announcement solicits proposals for scientific participation in the Mars Observer mission. For this mission, four (4) types of scientific participation are ultimately envisioned; these types are described immediately below. This AO invites proposals for the first three (3) types, while proposals for the fourth type will be invited at a later time.

1. Principal Investigator/Instrument Proposals:

Investigations that involve the provision of a scientific instrument and the analysis and interpretation of data from that instrument by a group of scientists. Prospective participants in this category must designate a single Principal Investigator (PI) and a limited number of Co-Investigators (Co-I's), each of whom must have a well-defined role, in their proposals.

2. Facility Instrument Proposals:

Investigations by individuals using NASA-provided instrumentation (Facility Instruments) that may be selected for the Mars Observer. NASA is considering providing two Facility Instruments: a Gamma-Ray Spectrometer (GRS) and a Visual and Infrared Mapping Spectrometer (VIMS). In addition, the spacecraft telecommunications system (TCS), which will be provided by NASA, may also be used as a Facility Instrument for scientific investigations. (Background information, as well as brief descriptions of these Facility Instruments, including the TCS, are given below in Section V.A.3., and more detailed information is contained in Volume III of the Proposal Information Package.)

Individuals may propose to be the Team Leader (TL) or a Team Member (TM) on NASA-formed teams using Facility Instruments (GRS, VIMS, and TCS) on the Mars Observer for scientific

investigations. Individuals proposing to be Team Leader will also be considered for Team Member in the event that they are not selected as Team Leader; if they do not wish to be so considered, they should so state in their proposals. In preparing their proposals, such individuals should note the following conditions, which are discussed in more detail below (see Sections V.A.3 and VII.D):

(a) There is no commitment by NASA at this time to fly any Facility Instrument on the Mars Observer or to use the TCS as a Facility Instrument. Such a decision will not be made until after the review of proposals received in response to this AO, the tentative selection of investigations, and the completion of the Investigation Accommodation Phase (see Section VI.B).

(b) NASA will consider PI/Instrument proposals which address science objectives similar to those addressed by the candidate Facility Instruments. The decision as to whether to proceed with a Facility Instrument or with a competing PI/Instrument investigation will be made as part of the selection process, with both quality of a proposed investigation and cost being key considerations.

(c) Proposals for Team Leader or Team Member must be submitted by individuals. Proposals from teams or groups of investigators will not be considered. However, individual proposers may include the participation of appropriate support personnel in their proposals.

(d) An individual may submit both a PI/Instrument proposal whose science goals are similar to those addressed by a candidate Facility Instrument and a proposal to be Team Leader or Team Member on that Facility Instrument Team.

3. Interdisciplinary Scientist Proposals:

Investigations by individuals who wish to propose interdisciplinary investigations requiring use of the data from a set of complementary instruments and who also wish to participate in all phases of the mission, including: definition, science planning, operations, data management, data analysis, and publication of results. Interdisciplinary Scientist proposals must be submitted by individuals. Proposals from teams or groups of investigators will not be considered. However, individual proposers may include the participation of appropriate support personnel in their proposal.

NASA plans to select a limited number of such interdisciplinary investigations. Each investigator selected will be designated as an Interdisciplinary Scientist (IDS). Each IDS will be selected on the basis of the scientific quality and value of the investigation proposed and on the ability of the IDS

to support the Project by maintaining a broad and critical scientific overview of mission activities during the planning and operations phases of the Mars Observer mission.

Current plans envision that each IDS will be the chairman of a subgroup of the Project Science Group (PSG) (see Section I.E). These subgroups will be responsible for activities and advisory functions in particular interdisciplinary areas having special importance or impact on the overall mission. Areas under current consideration for the formation of such subgroups are: Geosciences, Climatology, and Data Management and Archiving. Prospective IDS proposers should indicate their interest in one of these or in other appropriate areas and should describe both their qualifications for carrying out the scientific investigations and for supporting the Project by leading an appropriate subgroup.

4. Participating Scientist Proposals:

Investigations that are either instrument-specific or interdisciplinary, carried out by scientists who wish to participate only in the data collection and analysis phases of the mission. Each individual whose investigation is selected will be designated as a Participating Scientist (PS) and may be attached to existing teams or groups if and when appropriate, either prior to launch or during the operations phase of the mission. Proposals for Participating Scientist are not solicited by this AO, but will be the subject of one or more future announcements.

It is anticipated that such PS investigations will be predominately Mars-oriented (see Announcement Objectives, Section II), but that NASA will consider proposals for high-quality science activities that could use the existing Mars Orbiter payload to address other science goals, to the extent that such other activities can be accommodated without compromising the basic objectives of the Mars Observer mission.

At this time, proposals are solicited only for investigations listed under items 1, 2, and 3 above.

C. SCHEDULE

A written Notice of Intent, signifying the writer's intent to submit a proposal in response to this AO, is due at NASA Headquarters on or before May 3, 1985. Details are given in Section VII.A.

Individuals who submit Notices of Intent will then be sent a Proposal Information Package consisting of documents which provide details about the Mars Observer Project, the spacecraft, and other information needed to prepare the proposal (for further information, see Section VII.B).

A Pre-Proposal Briefing will be held on May 23, 1985, at the Jet Propulsion Laboratory (JPL) in Pasadena, CA, to provide additional information to prospective proposers. The purposes of this Briefing will be to present details of the Mars Observer program and to respond to any questions that potential proposers may have. Further information concerning this meeting will be sent to individuals who respond with a Notice of Intent, or to others who request this information in writing from the Mars Observer Program Scientist at NASA (for address, see Section VII.A). Individuals who plan to attend the Pre-Proposal Briefing should advise NASA of their planned attendance so that the anticipated total attendance can be estimated and appropriate arrangements made.

Proposals must be received at NASA on or before August 2, 1985.

The tentative selection of investigations is planned to take place in February 1986.

D. PHASED IMPLEMENTATION OF INVESTIGATIONS

Selection of the spacecraft for the Mars Observer mission will not take place until after the publication of this announcement. Accordingly, it is not possible to provide potential proposers with the exact specifications of the spacecraft to be selected. In order to provide a common basis for the evaluation of proposals, we, therefore, plan to provide to prospective proposers a set of spacecraft requirements and constraints rather than a detailed description of the actual spacecraft. These requirements are the same as those provided to potential proposers for the spacecraft selection; they are described in Volume VII of the Proposal Information Package.

We recognize that, because the actual spacecraft will not be selected until after receipt of proposals submitted in response to this AO, there is a chance that proposed investigations and instrument designs may not be fully compatible with the selected spacecraft and/or payload. Therefore, immediately after the tentative selection of investigations, an Investigation Accommodation Phase will take place, which will last about six months.

During this Investigation Accommodation Phase, all instruments in the tentatively selected payload will be reviewed for cost and compatibility with the selected spacecraft. All tentatively selected investigations, including those of Team Leaders, Team Members, and Interdisciplinary Scientists, will be reviewed for cost, compatibility with the selected spacecraft, and compatibility with the final payload to be selected.

NASA does not, at this time, plan to deliberately proceed with an oversubscribed payload into the Instrument Accommodation Phase of the Mars Observer mission. However, after review and

evaluation of proposals submitted in response to this AO, NASA may tentatively select, for further evaluation during the Investigation Accommodation Phase, more than one instrument that addresses a similar set of science objectives. In such a case, a final decision on the selection of such instruments will be made at the end of the Investigation Accommodation Phase, as part of the process of final confirmation and selection of the investigations and the Mars Observer payload (see Section VI.B). It should be recognized that incompatibilities between instrument requirements and spacecraft resources identified during the Investigation Accommodation Phase may preclude proceeding with the full set of investigations that had been tentatively selected.

Final selection and confirmation of all investigations will take place at the conclusion of the Investigation Accommodation Phase. A Science Confirmation Review is planned for September 1986, with final selection planned to take place in November 1986.

E. FORMATION OF PROJECT SCIENCE GROUP

After selection of the investigations, a Project Science Group (PSG) will be established. All Principal Investigators of flight instruments (PI/Instrument proposals), all Team Leaders of facility instruments (Facility Instrument proposals), and all Interdisciplinary Scientists will automatically become members of the PSG. Other members will include the Project Scientist (Chairman) and the Program Scientist. The PSG will meet regularly throughout the lifetime of the mission and will work with the Project Manager to optimize the science return and to resolve conflicts among requirements. Responsibilities of the PSG members are described in detail in Volume VI (Science Management Document) of the Proposal Information Package.

F. SUBSEQUENT ANNOUNCEMENTS

One or more additional opportunities to participate in the Mars Observer mission as a Participating Scientist (PS) will be announced later. The release of these announcements will be timed to permit selection of Participating Scientist activities for appropriate planning and data-gathering periods.

II. ANNOUNCEMENT OBJECTIVES

General scientific objectives for the exploration of Mars have been established by the appropriate NASA advisory committees, including the Committee on Planetary and Lunar Exploration (COMPLEX) of the National Academy of Sciences' Space Science Board and the NASA Advisory Council's Solar System

Exploration Committee (SSEC). These general objectives have been reviewed and adopted for this mission by the Mars Observer Science Working Group. For additional information, see Volume V (Mars Observer Science Working Group Report) of the Proposal Information Package.

To be considered, investigations proposed for the Mars Observer mission must address one or more of the following goals:

- o Determine the global elemental and mineralogical character of the surface material.
- o Define globally the topography and gravitational field.
- o Establish the nature of the magnetic field.
- o Determine the time and space distribution, abundance, sources, and sinks of volatile material and dust over a seasonal cycle.
- o Explore the structure and aspects of the circulation of the atmosphere.

This list does not represent any priority order.

These goals have been derived directly from the strategy, recommended by the SSEC, to develop missions which are highly focused on a limited set of scientific objectives. These goals reflect the fact that the Mars Observer mission is a deliberately-limited one that is focused on the geosciences and climatology of Mars. Future missions, recommended by the SSEC and now under study, will address other aspects of the study of Mars.

III. MISSION BACKGROUND

Mars has been, and continues to be, an important focus for planetary studies. It occupies an intermediate position in planetary evolution between airless, inactive worlds like the Moon and Mercury, and the more continually active planets like Venus and Earth. Like the Moon, it possesses ancient, heavily cratered regions in which the earliest history of the formation of the planet may be preserved. Like the Earth, it possesses an atmosphere, polar ice caps, volcanoes, possible river valleys, and evidence of major climatic changes in the past.

Mars appears to be the most hospitable environment for life in the solar system, outside of the Earth itself, and there is continued interest in the biological aspects of Mars despite the lack of evidence for life from the Viking Lander experiments. Our current understanding of Mars is largely based on a

substantial amount of data that has been collected by previous spacecraft missions. The detailed orbital mapping carried out by the Mariner 9 and Viking Orbiter spacecraft, together with the ground views and chemical data provided by the Viking Landers, constitute an important data base for planning future missions.

Mars is an important key to studying several general planetary processes--meteorite bombardment, volcanism, atmospheric development and evolution, and major climatic changes with time. Studies by COMPLEX and other scientific advisory committees have also stressed the importance of understanding Mars as a member of a triad of terrestrial planets--Venus, Mars, and Earth. The study of Mars is not only an examination of an exciting world; it is an inquiry into the nature and development of other planets, including the Earth itself.

The Mars Observer and the missions to follow it are part of a strategy developed by the SSEC in 1980-1982 for future exploration of the solar system. In implementing this strategy, NASA is considering a series of missions to a variety of solar system targets--inner planets, outer planets, and small bodies (comets and asteroids). These missions will combine focused but high-quality science goals and investigations, maximum technical inheritance of spacecraft and instruments, cost-effective mission operations, and disciplined management to insure that cost targets are attained. Two types of such missions are under consideration: the Planetary Observers for missions in the inner solar system, and the Mariner Mark II spacecraft for missions to the outer solar system.

The Mars Observer is the first mission of the Planetary Observer type. It embodies several special characteristics--the use of an existing spacecraft design; a sun-synchronous, low-altitude, and near-polar orbit, and a group of focused and highly complementary scientific experiments to emphasize the study of the important areas of geosciences and climatology. Future Planetary Observer missions to Mars, now under study, will emphasize other aspects of Mars-related science.

IV. CRITICAL DATES FOR PROPOSALS

May 3, 1985. Deadline for receipt of Notices of Intent at NASA Headquarters, Washington, DC.

May 23, 1985. Pre-Proposal Briefing at the Jet Propulsion Laboratory, Pasadena, CA.

August 2, 1985. Deadline for receipt of proposals at NASA Headquarters, Washington, DC.

February 1986. Tentative selection of investigations.

V. REQUIREMENTS AND CONSTRAINTS

A. MISSION DESCRIPTION

1. Baseline Mission Plan

The Mars Observer mission will involve the launch of a single spacecraft from the Space Shuttle, using an upper stage launch vehicle, during the Mars opportunity of August-September 1990. A Type II trajectory, with a total flight time of nearly one year, has been selected to provide adequate on-orbit mass performance utilizing low-cost upper stages. Arriving at Mars in August 1991, the Mars Observer spacecraft will be inserted into an initial orbit. A period of up to 80 days will then be occupied with checkout of the spacecraft and with changing the plane of this initial orbit to the desired sun-synchronous orientation. After this period, the mapping phase of the mission will begin. Mission duration will be one Mars year (687 days) of science operations in this mapping orbit.

The mapping orbit will be a low-altitude, nearly circular, sun-synchronous orbit with a baseline design altitude of 361 km. The orbit will be inclined 93 degrees to the equator and will be oriented such that the dayside pass occurs near 2:00 P.M. local time. Consistent with quarantine policy for planetary spacecraft missions to Mars, the spacecraft will be raised into a higher orbit at the end of the mission.

The Spacecraft Telecommunications Subsystem (TCS) will consist of an X-band uplink (7145-7190 MHz) and an X-band downlink (8400-8450 MHz). The TCS will use an Earth-pointing, two-axis-articulatable high gain antenna. (For further details, see Section V.A.3.d.)

The science data collection strategy will be to record data continuously over a 24-hour period and then play the data back through the Deep Space Network (DSN) during one tracking station pass per day. Total payload data record rates (science plus engineering) of 1.5, 3.0, 6.0, and 12.0 kilobits per second (Kbps) will be used. The 12 Kbps data rate will be available only for limited periods to accommodate the data acquisition of high-data-rate instruments. The spacecraft data storage capacity is 24 hours at 6 Kbps. Additional tracking station passes, estimated to be one 8-hour pass every three days, will be used for returning real time data at data rates of up to 32 Kbps.

The data collection and mapping phase of the Mars Observer mission will extend from approximately October 1991 to September 1993. The final increment of the Supplementary Experiment Data Record (SEDR) is expected to be delivered to the Investigators in October 1993. The final summary science reports will be due seven months later, in May 1994.

2. Strawman Instrument Payload

During preliminary studies of the Mars Observer mission, the potential instrumentation needed to satisfy the science objectives was closely examined to seek a proper balance between anticipated scientific results and mission costs. The result of these studies was the definition of a strawman payload that is capable of satisfying the scientific objectives and which can also be accommodated on a number of candidate Earth-orbital spacecraft with minimal redesign or modification of the instruments. The strawman payload has been used to assist in the process of mission definition, and it will be used as a reference set in the evaluation of proposals for the spacecraft itself.

The strawman payload contains the following:

- o Gamma-Ray Spectrometer (GRS) (Facility Instrument--see Section V.A.3.b).
- o Visual and Infrared Mapping Spectrometer (VIMS) (Facility Instrument--see Section V.A.3.c).
- o Atmospheric Profiler/Sounder.
- o Radar Altimeter.
- o Ultraviolet Photometer.
- o Ultraviolet Spectrometer.
- o Magnetometer.
- o Spacecraft Telecommunications Subsystem (TCS), which may be operated as a Facility Instrument--see Section V.A.3.d.

These strawman instruments are briefly described as the payload in Volume VII (Spacecraft Requirements Document) of the Proposal Information Package. It should be understood that this strawman payload concept has been developed for planning purposes only and as an aid to evaluation of proposals for the Mars Observer spacecraft. The actual Mars Observer payload will be determined from the competitive evaluation of proposals submitted in response to this AO. It may not include instruments in the strawman payload, and it may include entirely different instruments.

3. Facility Instruments

a. Background. In response to the strategy and recommendations developed by the SSEC, NASA's Solar System Exploration Division has established a program to define and develop certain instruments considered appropriate for a series

of related future solar system missions. The purpose of this activity is to insure a steady level of instrument development to meet the demands of future missions in a cost-effective manner, especially when there is a high degree of commonality between the requirements of successive missions. The intention is to use appropriate modifications of these instruments as Facility Instruments on future missions. Within this Planetary Instrument Definition and Development Program (PIDDP), Instrument Development Teams (IDT's) have already been established to undertake the definition and development of several appropriate instruments.

Two such instruments, the Gamma-Ray Spectrometer (GRS) and the Visual and Infrared Mapping Spectrometer (VIMS), are being considered by NASA as candidate Facility Instruments for the Mars Observer mission. IDT's have already been established for these instruments, and the charters of these IDT's require the provision of an instrument design that meets the objectives of the Mars Observer mission and that can also be adapted to other programs and missions at a reasonable cost. Because the spacecraft TCS will be provided by NASA as part of the mission, it is also considered as a Facility Instrument, although no IDT is involved in its development. Brief descriptions of the GRS, VIMS, and TCS are given below; for more details, see Volume III of the Proposal Information Package.

There is no commitment at this time to include either the GRS or the VIMS in the Mars Observer mission payload; similarly, there has been no decision to make the TCS available for scientific investigations. Such decisions will be made solely on the basis of proposals received in response to this AO.

In the event that the GRS or the VIMS is selected for inclusion in the Mars Observer mission payload, or the decision is made to use the TCS as a Facility Instrument for scientific investigations, NASA will form a Flight Investigation Team for each instrument involved (GRS, VIMS, or TCS). This AO invites proposals from individuals to be the Team Leader (TL) or Team Member (TM) of such a team (see Section I.B.2). Selection of Team Leaders and Team Members for the Mars Observer mission will be made only on the basis of proposals received in response to this AO.

Proposers who wish to be Team Leaders or Team Members of Flight Investigation Teams for the GRS, VIMS, or TCS should submit Facility Instrument proposals (see Sections I.B.2 and VII.D). Proposers for the GRS and VIMS Teams should propose on the basis of the baseline instrument descriptions given in Volume III of the Proposal Information Package. In the case of the TCS only, individuals proposing to be Team Leader or Team Member may propose to use the planned TCS as established (see Section V.A.3.d and Volume III of the Proposal Information Package), or they may also propose modifications or additions to the TCS in order to enhance the science capabilities of the mission.

Individuals proposing such modifications and/or additions to the TCS must include with their proposal: (1) a detailed estimate of costs for the modifications and/or additions, including such items as algorithm development and data reduction; (2) sufficient detailed information about special ground equipment or ground procedures required by these modifications and/or additions so that their costs can be estimated; and (3) the completed instrument questionnaire for PI/Instrument proposals, which is provided in Volume II of the Proposal Information Package.

In the event that such modifications and/or additions to the TCS are selected, the Mars Observer Project will be responsible for implementing such modifications and/or additions and for ensuring their flightworthiness and compatibility with the spacecraft and payload.

After tentative selection of investigations and the formation of the appropriate Flight Investigation Teams, the Mars Observer Project will be responsible for the development of the flight versions of the Facility Instruments, in conjunction with the appropriate Flight Investigation Teams and IDT's. Each IDT will provide for the design, fabrication, calibration, and integration of the flight model of each selected Facility Instrument. The Flight Investigation Team will provide requirements for the Facility Instrument, including requirements for calibration and science data acquisition. The leaders of each Flight Investigation Team will be required to work closely with existing IDT leaders in order to establish any necessary changes in design requirements and to insure successful fabrication, calibration, and integration of the flight model Facility Instrument. The Flight Investigation Team will also be responsible for experiment design, observation planning, procedure and algorithm development for data reduction, science analysis and interpretation, publication of results, and data archiving.

The IDT's already formed will continue to function independently during the period of development of the Mars Observer mission to undertake the definition and development of advanced versions of the appropriate instruments for future missions.

Brief descriptions of the candidate Facility Instruments for the Mars Observer are given below. More detailed information is contained in Volume III of the Proposal Information Package.

b. Gamma-Ray Spectrometer (GRS) The GRS will be used to obtain geochemical maps of the uppermost martian surface by measuring the energy spectrum of gamma-rays emitted by the surface materials. Characteristic gamma radiation from planetary surfaces is produced both by natural radioactivity and by cosmic-ray primary and secondary particle interactions.

Semiquantitative elemental abundances can be determined from the analyses of these gamma-ray emissions. The following elements should be most easily detectable by the GRS: K, Th, U, H, O, Mg, Al, Si, S, Ca, Ti, Cl, and Fe. At a spacecraft altitude of about 350 km, the spatial resolution of the current design of the GRS would be about 200 km.

c. Visual and Infrared Mapping Spectrometer (VIMS)

The goal of the VIMS is to obtain global data, at subkilometer resolution, about the mineralogical and chemical composition of martian surface materials by measuring the intensity and spectral distribution of absorption features in the visible and infrared radiation reflected by the surface. The VIMS will build on techniques developed for the Near Infrared Mapping Spectrometer (NIMS), an instrument which will be flown on the Galileo mission to Jupiter.

The baseline VIMS instrument contains 320 spectral channels between 0.3 and 4.3 microns, with a spectral sampling interval of about 11 nanometers. The detectors are two line arrays: 64 elements of silicon (Si) to detect visible wavelengths, and 256 elements of indium antimonide (InSb) for the infrared. It is hoped that the baseline spectral range can be extended to 5.2 microns (the full spectral range of InSb); this extension will depend on the ease with which the instrument's thermal background can be reduced longward of 4.3 microns. If this baseline instrument were to be flown on the Mars Observer, the instantaneous field of view of the instrument would be approximately 0.89 milliradians, producing approximately a 310-meter footprint from the 361-km orbit of the Mars Observer.

d. Spacecraft Telecommunications Subsystem (TCS)

The Mars Observer spacecraft transponder will provide X-band uplink and downlink capability in both coherent and noncoherent modes and will also support two-way ranging. The X-band uplink frequency will be in the range 7145-7190 Megahertz (MHz); the downlink frequency will be specified by selection of the uplink frequency and will be in the range 8400-8450 MHz.

Interfaces will be provided on the spacecraft transponder to accommodate an ultrastable oscillator and exciters for an S-band or Ka-band downlink; the exact frequencies available will be specified by selection of the uplink frequency. However, the devices themselves will be included only if proposed by potential investigators and subsequently selected.

B. SPACECRAFT CONSTRAINTS

The spacecraft finally selected will impose specific constraints on the mass, power, volume, and data return capabilities available to the science payload. These

constraints, expressed as requirements on the spacecraft manufacturer, are described in detail in Volume VII of the Proposal Information Package.

The payload constraints are:

Mass: 85 kg

Power: 91 watts

Data: Capability to record at 1.5, 3.0, 6.0, and 12.0 Kbps.

Real time downlink transmission will be at a maximum of 32 Kbps. The project plan is to provide one 34-meter tracking station pass and 4.5 hours of data playback, orbit determinations, and commanding per day. All science data will be Reed-Solomon encoded to permit use of data compression techniques. The overhead to accomplish this encoding is included within the data rates stated above. The downlink telemetry data will be transmitted at the maximum rate consistent with the coding performance and will essentially be error free. A profile of record rate corresponding to downlink performance is contained in Volume IV of the Proposal Information Package.

Onboard storage will be provided by the digital tape recorder. Further reference design and interface information is contained in Volume VII of the Proposal Information Package.

The spacecraft will provide a fixed mounting position for each instrument. Exceptions are instruments such as a gamma-ray spectrometer or a magnetometer, for which booms will be provided. The spacecraft will not provide a scan platform, and any articulation needed for a science experiment must be accommodated within the instrument itself. Each instrument will be required to order its own science and engineering data into a standard format.

C. SPECIAL MISSION CONSTRAINTS

Certain special constraints are mandated by the intended low-cost character of the Mars Observer mission. Others arise because the science instruments to be carried by the Mars Observer will be used in systematic orbital investigations lasting an entire Mars year (687 days). These instruments will generate extensive and complementary data sets.

The intended low-cost nature of the mission creates two special conditions: the scientific payload will be limited by cost as well as by mass and power, and the number of selected investigators for each investigation must be restricted. This latter limitation will constrain the number of Co-Investigators, Facility Team Members, and Interdisciplinary Scientists that can be selected on the basis of this AO.

It is especially important that individuals proposing to be PI's on flight instrument investigations adequately justify the number of Co-I's that they plan to include in their teams. Each Co-I must have a defined task or tasks of significant value. Time phasing of Co-I involvement should be seriously considered in order to reduce overall personnel costs.

Special requirements are also created by the global character of the data to be obtained, by the repetitive nature of data collection in different geographic regions of Mars, and by the complementary nature of the data sets from different instruments. To meet these requirements, individuals submitting PI/Instrument or Team Leader proposals must include a plan for:

- o Maintenance of raw and reduced data sets during the mission and until final archiving of the data.
- o Registration of reduced data sets, using agreed-upon standards, so that the reduced data can be shared among the various science teams and Interdisciplinary Scientists within the project.
- o Systematic data archiving, release, and distribution of reduced data records before the end of the project.

More information about plans for data collection and management on the Mars Observer mission is contained in Volume IV (Project Overview), Volume VI (Science Management Document), and Volume VIII (Mission Operations) of the Proposal Information Package.

No policies for the data rights of Investigators or groups of investigators are established by this AO. It is anticipated that such data rights will exist, but the establishment of such rights, and of the policies governing them, will be done after selection of investigations and the formation of the PSG. All policies concerning data rights, data management, data archiving, and data release will be developed by the Program and Project in conjunction with the PSG.

D. FLIGHT ENVIRONMENT

The planned Mars Observer mission requires that the instruments survive and remain operable in a specific flight environment. Information on the expected flight environment is provided in Volume X (Expected Environments) of the Proposal Information Package.

E. MISSION OPERATIONS

In response to the recommendations of the SSEC concerning the operations of future planetary missions, the mission operations for the Mars Observer will involve the introduction of

new procedures to reduce costs and to enable a multimission mode of operation that is intended to be followed by subsequent solar system exploration missions. A significant feature of these new procedures is that the operations of the science teams associated with an investigation will be located at the Investigator's home institution.

For the Mars Observer mission, the Project will provide to each Investigator (PI, TL, and IDS), and to other individuals (Co-Is, TMs) as appropriate, a workstation which will support the following mission-related activities:

- o Delivery of advanced planning aids from JPL to the Investigator and his team.
- o Construction by the Investigator, and transmission to JPL, of instrument-specific command sequences.
- o Delivery of raw instrument data and geometric spacecraft information from JPL to the Investigator.
- o Communication of data to and from other Investigators.

During Mars-orbital operations, planning will be carried out in approximately 30-day units, based on sequences developed prior to launch. Flexibility will be limited. Individual command loads will be of several days' duration, and only a limited late-date update capability will exist.

During mission operations, raw instrument data in "packet" form will be maintained at JPL and will be accessible by the Investigators through their workstations. Each Investigator will be responsible for promptly checking and reporting the health of his/her instrument as data become available. Geometric information (spacecraft attitude and orbit parameters) sufficient to reconstruct instrument pointing will also be available and accessible to the Investigator through the workstation. The reconstruction of these data to obtain locations, ground tracks, instrument pointing directions, etc. will be the Investigator's responsibility. The Investigator will also be responsible for maintaining updated data records that are accessible via the workstation to support interdisciplinary science activities.

More details about the Investigator's responsibilities are given in Section V.G. below (Data Records Requirements and Data Analysis) and in Volumes IV and VIII of the Proposal Information Package.

Preliminary definition of the workstations is already under way. It is intended that, after selection, the Investigators will participate, through the PSG, in the final definition and design of these workstations and in the development of common software and data formats to assist the Investigators in meeting

their responsibilities for data management and archiving. The Mars Observer Project will support the development of the workstations and the common software to the maximum extent possible. The details of the software implementation will be established by discussions between the Project management and the PSG. All Investigators must be prepared to use the workstations during mission operations, and the Investigators will be expected to support testing of the workstations prior to launch.

For the purpose of providing a common basis for the review of proposals, proposers need not consider costs associated with the development of the workstations and the common software and data formats. However, they should provide the best possible estimate of all costs for data management requirements (hardware and software) that are unique to their particular investigation and which clearly cannot be met by the workstations alone.

F. PROGRAM MANAGEMENT

The Solar System Exploration Division of the Office of Space Science and Applications has program management responsibility for the Mars Observer mission. Project management responsibility has been assigned to the Jet Propulsion Laboratory (JPL), in Pasadena, CA.

The design, development, and implementation of the Mars Observer mission will involve the direct interaction of Project Management and the Project Science Group (PSG) (see Section I.E).

G. DATA RECORDS REQUIREMENTS AND DATA ANALYSIS

Many of the scientific objectives of the Mars Observer mission can be realized only by the detailed analysis of data sets that are co-registered with respect to both geographic location and time. While some of these analyses will be accomplished during the mission itself, many more will only be achieved by extended study during a data analysis phase that will follow the mission.

To make shared analyses possible, both during and after the mission, the Project will require that raw data, calibration records, and processed data be maintained in an updated/upgraded form throughout the period of investigation. Specifically, Principal Investigators and Team Leaders must plan to:

- o maintain a continually updated/upgraded record of the "best version" of the data until significant changes in data calibration no longer occur.
- o adopt a standard format, agreed on by the PSG, for the "best version" of the data that will make the data easily accessible through the established workstations.

- o make updated/upgraded data records available to other Investigators during the mission for shared analysis at times and to an extent determined by the PSG or by mutual agreement among Investigators.
- o prepare a comprehensive set of data records for deposition in a designated archive at a time and in a format that will be agreed upon; see Volume VIII (Mission Operations) of the Proposal Information Package.

In order to establish a common basis for the evaluation of proposals, the data analysis period used for budgeting purposes should be compatible with the mission schedule (see Section V.A.1) and should extend to a date six months after the Project delivers the last Supplementary Experiment Data Record (SEDR). It is anticipated that subsequent studies of the Mars Observer data will be supported through competitive Data Analysis programs.

VI. PROPOSAL EVALUATION CRITERIA, SELECTION, AND IMPLEMENTATION.

A. EVALUATION CRITERIA

The fundamental aim of the investigation acquisition process is to identify scientific ideas and unique instrumental capabilities which best suit the overall scientific and cost objectives of the Mars Observer program, as described in this AO (see Sections I.A. and II). Accordingly, the following criteria, listed in order of descending importance, will be used in evaluating all proposals submitted in response to this AO:

1. The scientific and technological merit of the proposed investigation and its relevance to this specific opportunity and to the established mission plans and objectives.
2. Total cost and management considerations. Total cost will be considered to include not only that proposed for the instrument development (for PI/Instrument proposals) and for data analysis, but also the impact of the instrument and the investigation on spacecraft and mission operation costs. Management aspects include demonstrated capability to adhere to sound business practices.
3. For proposals involving provision of an instrument, the adequacy of the proposed instrument for the proposed investigation, with particular regard to the instrument's ability to supply the data needed for the investigation within the generally expected spacecraft constraints such as mass, volume, power, available data

storage and transmission rates, and playback sequencing. Relationships of proposed instrumentation to developed techniques, to previously flown spacecraft instruments, or to existing hardware will be factors specifically considered in determining adequacy.

4. The competence and relevant experience of the proposer and any proposed investigative team as an indication of their ability to carry the investigation to a successful conclusion.
5. The technical and cost risk (uncertainty) associated with the investigation.
6. The reputation and interest of the proposer's institution, as measured by the willingness of the institution to provide the necessary support (logistics, facilities, etc.) to insure that the investigation can be completed satisfactorily.

NASA may desire to select only a portion of the proposer's investigation and may also desire his/her participation with other investigators in a joint investigation. In this case, the proposer will be given the opportunity to accept or decline such partial acceptance and/or participation with other investigators.

B. EVALUATION AND SELECTION PROCEDURES

Proposals received in response to this AO will be evaluated in accordance with the provisions of NASA Handbook NHB 8030.6A ("Guidelines for Acquisition of Investigations"). All proposals will be subjected to a preliminary review by the NASA Program Office to determine their suitability and responsiveness to the AO. Proposals which are not responsive to the intent of the AO will be handled as correspondence. Those proposals which are responsive to the AO will then be subjected to a preliminary technical, management, and cost assessment.

Following these preliminary actions, the scientific and technical aspects of each proposal will be assessed by panels composed of individuals who are scientific and technical peers of the proposers. The purpose of this evaluation will be to determine the scientific and technical merit of each proposal, expressed in terms of its strengths and weaknesses. Results of the earlier technical and cost reviews will be available to these reviewers.

After these evaluations, a NASA ad hoc subcommittee of the Space Science and Applications Steering Committee (SSASC) will consider the proposal evaluations, together with additional information regarding engineering, management, cost, and safety aspects. This subcommittee will then prepare a ranking of the proposals according to the following categories:

Category I: Well-conceived and scientifically and technically sound investigations pertinent to the goals of the program and the Announcement's objectives and offered by a competent investigator from an institution capable of supplying the necessary support to ensure that any essential flight hardware or other support can be delivered on time and that the data can be properly reduced, analyzed, interpreted, and published in a reasonable time.

Category II: Well-conceived and scientifically and technically sound investigations which are recommended for acceptance, but at a lower priority than Category I.

Category III: Scientifically and technically sound investigations which require further development.

Category IV: Proposed investigations which are recommended for rejection for this particular opportunity, regardless of the reason.

Following the evaluations described above, the NASA Program Office will develop a payload recommendation. This payload recommendation, and information on all the proposals, will be submitted to the SSASC for review. Tentative selections will be made by the Associate Administrator for Space Science and Applications, based on the final recommendations of that Committee.

Subsequent procedures for the Mars Observer mission will be different from those employed in many previous solar system exploration missions. In previous missions, NASA has first selected a payload and has then developed a custom spacecraft to accommodate the payload requirements. This approach involved supporting an Instrument Definition Phase, during which changes to the designs of both the spacecraft and the science instruments could be negotiated and carried out.

In contrast to that procedure, the Mars Observer mission will use an existing spacecraft design that will not be significantly modified to accommodate the science instruments. The integration of spacecraft and instruments will therefore require that the instruments be adapted to the constraints imposed by the spacecraft.

Therefore, after tentative selection of the investigations, the Mars Observer Project will enter an Investigation Accommodation Phase, which will last about six months. During this period, all tentatively selected investigations will be evaluated for cost, compatibility with the selected spacecraft, compatibility with other mission constraints, and (for IDS investigations) compatibility with the final selected payload.

Support provided to instrument-related Investigators (PI's, TL's, and TM's) during the Investigation Accommodation Phase will be primarily for achieving an understanding of the instrument modifications required to match the configuration and constraints of the specific Mars Observer spacecraft and for developing a detailed plan for building, testing, and calibrating the flight instruments themselves. Support for IDS Investigators during this period will be to develop a more detailed understanding of the requirements for their investigations and to permit a more detailed assessment of the compatibility of the investigation with the tentatively selected payload. In keeping with the philosophy and recommendations of the SSEC for implementing the Planetary Observer missions, Project funds will not be utilized to support extensive activities involving the development of new technologies.

At the end of the Investigation Accommodation Phase, a Science Confirmation Review will be held to confirm all investigations and the final science payload. Confirmation of investigations will be subject to the following conditions:

1. Adherence to the financial constraints agreed upon. At the time of the Science Confirmation Review, the financial impact of each investigation upon spacecraft operations and mission operations will be evaluated.
2. For investigations involving foreign investigators, a guarantee of adequate support by their funding authority.
3. Demonstration, for all investigations, that the investigation is compatible with mission constraints, including those of mass, volume, power, configuration, data handling capability, compatibility with other instruments, and (for IDS investigations) compatibility with the instruments and payload actually selected.

VII. PROPOSAL SUBMISSION INFORMATION

This AO invites proposals from both United States and foreign scientists for all the types of investigations described. Foreign investigators are invited to propose as Principal Investigators, as Team Leaders, as Team Members, or as Interdisciplinary Scientists. In accordance with NASA policy, all investigations by foreign participants will be conducted without any exchange of funds.

The Mission Description (see Section V.A above and Volume IV of the Proposal Information Package), the Facility Instrument Description (see Section V.A.3 and Volume III of the Proposal Information Package), the Science Management Document (Volume VI

of the Proposal Information Package) and the Spacecraft Requirements Document (Volume VII of the Proposal Information Package) should be used as the basis for preparing proposals. Safety considerations for science instruments are addressed in Volume IX (Payload Policy and Requirements) of the Proposal Information Package.

Concepts for minor modifications and/or additions to the spacecraft which enhance scientific return may be included in the proposals. However, such proposed modifications must be clearly marked as such, and any costs required for necessary modifications in the baseline spacecraft will be attributed to the experiment in question.

A. NOTICE OF INTENT

A written Notice of Intent to propose should be submitted by all prospective proposers and should arrive at NASA Headquarters on or before May 3, 1985. (For more details on the schedule, see Section I.C.) This Notice must be written in English and should be addressed to:

Dr. Bevan M. French
Program Scientist, Mars Observer
Code EL (Ref. AO No. OSSA-2-85)
NASA Headquarters
Washington, DC 20546
U.S.A.

Telephone Number: 202-453-1596

Telex Number: 089 530

Foreign individuals responding to this AO should send their Notice of Intent to the same address, but should also send a copy of their Notice of Intent to:

International Affairs Division
Code LID (Ref. AO No. OSSA-2-85)
NASA Headquarters
Washington, DC 20546
U.S.A.

Telephone Number: 202-453-8452

Telex Number: 089 530

The Notice of Intent should briefly describe the objectives of the proposed investigation. A brief description of any proposed instrumentation should be included if it is essential to the investigation. Proposers should include their names, addresses, telephone numbers, telex or telemail numbers, and the names and addresses of their sponsoring organizations.

In cases where foreign investigators are to participate as Co-I's in a proposal from a U.S. PI (PI/Instrument proposals only), the names of all potential non-U.S. participants should be included in any Notice of Intent submitted by U.S. proposers, even if the details of their participation cannot be formalized by the deadline for receipt of the Notice of Intent. Similarly, foreign proposers who plan to include U.S. Co-I's in their proposals (PI/Instrument proposals only) should identify such individuals and their institutions in the Notice of Intent.

Individuals planning to attend the Pre-Proposal Briefing (see below, Section VII.C) should include in their Notice of Intent the number of individuals attending and any written questions that they wish answered at the Briefing.

At the time the Notice of Intent is sent, proposers should also send an independent communication to the Program Scientist (address above), advising NASA that such a Notice of Intent has been sent, in order to verify receipt and to insure timely processing of the Notice of Intent itself.

All material provided to NASA through this Notice of Intent is for information only and is not binding on the signatories. Additional information can be obtained from the Program Scientist at the above address.

B. PROPOSAL INFORMATION PACKAGE

A Proposal Information Package will be sent to all prospective proposers upon receipt of their Notice of Intent and to others upon receipt of a written request. The Proposal Information Package, which is intended to provide background information and specific details for the preparation of a formal proposal, contains the following documents:

Volume I	General Instructions and Provisions
Volume II	Proposal Preparation Guidelines
Volume III	Facility Instrument Descriptions
Volume IV	Project Overview
Volume V	Mars Observer Science Working Group Report
Volume VI	Science Management Document
Volume VII	Spacecraft Requirements Document
Volume VIII	Mission Operations
Volume IX	Payload Policy and Requirements
Volume X	Expected Environments

This Proposal Information Package is intended to provide information to prospective proposers and as an aid to the preparation of proposals. In case of a conflict between requirements outlined in this AO and those in the Proposal Information Package, the provisions of this AO and its Appendices will take precedence.

C. PRE-PROPOSAL BRIEFING

A Pre-Proposal Briefing will be held on May 23, 1985, at the Jet Propulsion Laboratory in Pasadena, CA, to provide additional information to prospective proposers. The purposes of this briefing will be to present details of the Mars Observer program and to respond to any questions that potential proposers may have.

Potential proposers should state in their Notice of Intent whether or not they plan to attend this Pre-Proposal Briefing and should indicate the number of colleagues associated with their proposal who will also attend. Individuals who plan to attend are invited to submit written questions to the Mars Observer Program Scientist (see address above, Section VII.A) in advance in order to ensure that such questions can be fully and completely answered at the Pre-Proposal Briefing.

Further details relating to this meeting will be sent to individuals who respond with a Notice of Intent or who request this information in writing from the Mars Observer Program Scientist (see address above, Section VII.A).

D. FORMAT OF PROPOSALS

1. General Proposal Format

A uniform proposal format will be required from all proposers in order to aid in proposal evaluation and to facilitate comparative analysis. This format, and the required contents, are summarized below. Please note that the three types of proposals invited by this AO (PI/Instrument, Facility Instrument, and Interdisciplinary Scientist; see Section I.B) have different format requirements.

General information and general proposal guidelines are provided as Appendices A and B to this AO. Specific procedures and details for each of the three types of proposals are described in Volume II (Proposal Preparation Guidelines) of the Proposal Information Package. Because three different types of proposals are invited by this AO, each of which requires different information, prospective proposers should carefully examine, and should prepare their proposals in accordance with, the detailed information given in Volume II.

Each proposal should be submitted in two (2) separately-bound volumes: Volume 1, Investigation and Technical Plan; and Volume 2, Management Plan and Cost Plan. Foreign proposers are not required to submit a Cost Plan for their activities but must submit a Management Plan. Furthermore, a Budget and Cost Plan must be submitted for any participation by a U.S. individual in a foreign proposal if it is anticipated that such participation will be supported by NASA (see Section VII.E). All documents

must be typewritten in English and must be easily legible. At least one copy of each document should be clear black print, on white paper, and of a quality suitable for reproduction.

2. Investigation and Technical Plan (Volume 1)

Volume 1 should consist of the main body of the proposal and any optional appendices. The volume should provide a clear statement of the proposed investigation and how it will address the overall scientific objectives of the Mars Observer mission. The proposal should contain enough background information to be meaningful to a reviewer who is generally familiar with the field, although not necessarily a specialist.

The description of any proposed instrumentation must provide adequate technical information to permit evaluation. In addition, it must specifically address those spacecraft resources, configurations, or special requirements necessary for successful implementation of the proposed investigation. This information should be given in sufficient detail to permit an evaluation of both the concept and the practical feasibility of the investigation. The proposal should also describe any recognized need for supporting laboratory research or ground-based, airborne, or other activities required to support developing the instrument and operating it during the mission.

The proposal should also contain the best possible description of the proposer's plans for data processing, management, and archiving, including the use of the remote workstations (see Section V.E). It is recognized that many of the details of these procedures are not established at this time, but the proposer should give as much information as possible concerning his plans, requirements, and costs, especially those for unique data management requirements (hardware and software) that cannot be accommodated with the workstations.

The title page of Volume 1, for all types of proposals, must state the title(s), name(s), address(es), affiliation(s), and telephone number(s) of the Principal Investigator, Co-Investigators, Team Leader, Team Member, or Interdisciplinary Scientist, as appropriate. In the preface to Volume 1 the proposer must also include the following two pages: (1) a separate abstract, one page or less in length, describing the proposed investigation; (2) a separate table, one page or less in length, listing the major instrument parameters or specifications of the investigation, where appropriate. The title page and the two additional pages are not included in the page limits specified below.

Details on length and other matters are given below for the separate types of proposals. Regardless of proposal type, for all proposals, appendices are limited to a total of ten (10) single-spaced, typewritten pages, without reduction.

a. PI/Instrument Proposals. For proposals submitted by a prospective Principal Investigator, the main body of Volume 1 is limited to a maximum of forty (40) single-spaced, typewritten pages, without reduction, including illustrations, and may contain no more than four (4) foldout pages. In these proposals, the roles and responsibilities of the PI and of each Co-Investigator must be described, along with the time-phasing of their activities. Because the number of participants will be limited, each participant must have an identified specific function which makes a demonstrable contribution to the development and/or implementation of the investigation. A condensed description of all prospective participants' relevant background, experience, and selected publications (if appropriate) should be provided in the body of the proposal.

b. Facility Instrument Proposals (GRS, VIMS, and TCS Teams). For Team Leader proposals, the main body of the proposal is limited to a maximum of thirty (30) single-spaced, typewritten pages, without reduction, including illustrations. For Team Member proposals, the main body is limited to a maximum of ten (10) single-spaced, typewritten pages, without reduction, including illustrations. Team Leader or Team Member proposals involving modifications or additions to the TCS (see Section V.A.3.a) are limited to a maximum of thirty (30) single-spaced, typewritten pages without reduction, including illustrations.

Proposals for Team Leader or Team Member on investigations using the GRS, VIMS, or TCS Facility Instruments must be submitted by individuals only. Proposals by groups of investigators are not solicited. Proposers may identify, and may request support for, specific individuals or support staffs whom they consider essential to the conduct of their investigations, but none of these individuals will be eligible for Team Membership without submitting an individual proposal.

A proposer who wishes to be considered for Team Leader must provide documentation in the body of the proposal which supports the request. Team Leader proposals must also contain a generic or conceptual plan that addresses optimum Team size and essential talents required for the Team to meet its responsibilities. Individuals proposing to be Team Leader will also be considered for Team Member in the event that they are not selected to be Team Leaders; if they do not wish to be so considered, they should so state in their proposal. Proposals for participation as a Team Member should, in addition to the scientific investigation proposed, provide information as to specific talents or technical capabilities that the candidate member would bring to the Team.

Team Leader and Team Member proposals involving modifications or additions to the TCS (see Section V.A.3.a) should also justify the proposed modifications and/or additions

in terms of their potential contributions to the Mars Observer mission. Such proposals must also include the completed instrument questionnaire for PI/Instrument proposals, which is provided in Volume II of the Proposal Information Package.

c. Interdisciplinary Scientist. Proposals for Interdisciplinary Scientist are limited to a maximum of fifteen (15) single-spaced, typewritten pages, without reduction, including illustrations. These proposals must be submitted by individuals. Proposals from teams or groups of investigators will not be considered. However, individual proposers may identify, and may request support for, appropriate support personnel in their proposal.

3. Management and Cost Plan (Volume 2)

This volume does not have page limitations. Foreign proposers are not required to submit a Cost Plan for their own activities but must submit a Management Plan. In addition, foreign proposers must provide (or arrange to be provided) to NASA a Budget and Cost Plan for U.S. individuals in their proposals, if it is anticipated that the participation of such individuals will be supported by NASA (see Section VII.E).

a. PI/Instrument Proposals. For these proposals, Volume 2 should include a list of key participants in the proposed investigations, together with brief statements of the backgrounds and areas of competence of each participant. Volume 2 should also include a detailed discussion of the specific roles that each of the participants and their institutions intend to play in the investigation. This discussion should include a statement of the portion of time which each participant expects to devote to the investigation and of the institutional resources on which each can draw.

Volume 2 must also provide a detailed estimate of the total cost of the investigation, along with sufficient technical information on which to judge the reliability of the figures. The assumptions on which the estimate is based should be stated, particularly with regard to government-furnished equipment and services. Details on Cost Proposal Certifications are provided in Appendix A (General Instructions and Provisions) to this AO.

b. Facility Instrument Proposals (Team Leader). For these proposals, Volume 2 should include a Management Plan and a Cost Plan based on the candidate Team Leader's best estimate of an optimum team size and the anticipated activity level of each of the members. No consideration need be given to the cost of building the Facility Instrument, but both the Management and Cost Plans should reflect such activities as experiment design, instrument calibration requirements, observation planning,

algorithm development and data reduction, and data archiving. Individuals proposing, as Team Leader, modifications or additions to the spacecraft TCS, must also include specific costs associated with their proposed modifications and/or additions (hardware, special ground equipment and/or operations, etc.) (See Section V.A.3.a).

It is recognized that, because Team Leader and Team Member proposals will be submitted separately, it will be difficult for prospective Team Leaders to develop a firm estimate of costs for the actual Team that will be selected. For the purposes of proposal evaluation, Team Leader proposals should contain the best possible estimate of costs, based on the proposer's consideration of the number and type of Team Members needed and the level of activity required to carry out Team responsibilities. More detailed estimates of the actual cost involved will be developed after selection of the Team Leader and Team Members for each Team.

c. Team Member and Interdisciplinary Scientist Proposals. Cost and Management Plans for these proposals may be simplified to the minimum needed to permit evaluation. It is expected that the bulk of costs for these proposals will be related to manpower (e.g., salary and travel for the Investigator and essential support personnel) and to data processing requirements. However, individuals proposing, as Team Member, modifications or additions to the spacecraft TCS, must also include specific cost associated with their proposed additions and/or modifications (hardware, special ground equipment and/or operations, etc.) (see Section V.A.3.a).

4. Certification

All proposals must be signed by an institutional official authorized to certify institutional support and sponsorship of the investigation as well as of the management and financial parts of the proposal.

5. Quantity

Thirty (30) copies of Volume 1 (Investigation and Technical Plan) and fifteen (15) copies of Volume 2 (Management Plan and Cost Plan) must be submitted to NASA by all proposers.

6. Submittal Address

Proposals must be mailed to the same NASA address as that for the Notice of Intent (see Section VII.A).

7. Deadline

Proposals must arrive at NASA Headquarters on or before August 2, 1985.

8. Notification

NASA will notify the proposers in writing that their proposals have been received. Proposers not receiving this confirmation within two weeks after the deadline should contact the Mars Observer Program Scientist at the above address (see Section VII.A).

E. FOREIGN PROPOSALS

Proposals from individuals outside the United States should be submitted in English and in the same format as U.S. proposals. Foreign proposers need not submit a Cost Plan unless NASA-supported U.S. individuals are involved in the proposal (see below). Foreign proposers must have their proposals reviewed and endorsed by the appropriate government agency. The endorsed copy of the proposal should be sent to the NASA International Affairs Division (for address, see Section VII.A), and should arrive before the deadline for receipt of proposals.

The additional copies of the proposal should be sent directly to the Mars Observer Program Scientist (for address, see Section VII.A) and should arrive before the deadline for receipt of proposals. Sponsoring agencies may, in exceptional circumstances, forward advance copies of unendorsed proposals directly to the Mars Observer Program Scientist if review and endorsement are not possible before the specified deadline. In such cases, NASA should be advised when endorsement can be expected.

In cases where the participation of a U.S. individual is included in a PI/Instrument proposal submitted by a foreign individual and where it is anticipated that such participation will be supported by NASA, a Budget and Cost Plan covering such participation must be submitted to NASA as part of the proposal. This Budget and Cost Plan must be signed by the U.S. individual and certified by the U.S. individual's institution. If it is more convenient to do so, such documentation may be mailed directly to the Mars Observer Program Scientist (for address, see Section VII.A). Such costs will be considered in the review and evaluation of proposals submitted by foreign individuals.


Foreign individuals who plan to participate as Co-I's on a U.S. PI/Instrument proposal must have such participation reviewed and endorsed by their appropriate governmental agency before such participation can be selected for the Mars Observer mission. Evidence of such review and endorsement should be provided at the time that the proposal is submitted or as soon as possible thereafter. Formal arrangements for such participation will be made by NASA's International Affairs Division after selection of the proposed participation.

All other correspondence from foreign proposers and their sponsoring organizations should be sent to NASA's International Affairs Division (for address, see Section VII.A).

Foreign proposals will go through the same review, evaluation, selection, and confirmation process as U.S.-originated proposals. Should a foreign proposal be selected, NASA will arrange with the sponsoring agency for participation on a cooperative (no-exchange-of-funds) basis, in which NASA and the sponsoring agency will each bear the cost of discharging its separate responsibilities, including travel and subsistence for its own personnel.

VIII. CONCLUSION

The Mars Observer mission will be a significant step forward in the systematic study of Mars and its relationships to the other terrestrial planets. The mission will provide a new level of understanding, on a global scale, of the Red Planet's geology, atmosphere, and climatic history. I invite you to participate in this important and exciting program.


B. I. Edelson
Associate Administrator for
Space Science and Applications

Enclosures:

1. Appendix A: General Instructions and Provisions
2. Appendix B: General Proposal Preparation Guidelines

APPENDIX A

GENERAL INSTRUCTIONS AND PROVISIONS

I. PROCUREMENT OF INSTRUMENTATION AND/OR GROUND EQUIPMENT

By submitting a proposal to NASA, the investigator and his institution agree that NASA has the option to accept all or part of the proposer's plan to provide the instrumentation or ground support equipment required for the investigation. NASA may furnish or obtain such instrumentation or equipment from any other source as determined by the selecting official. In addition, NASA reserves the right to require use, by the selected investigator, of U.S. Government instrumentation or property that subsequently becomes available, with or without modification, that will meet the investigative objectives.

II. TENTATIVE SELECTIONS, PHASED DEVELOPMENT, PARTIAL SELECTIONS, AND PARTICIPATION WITH OTHERS

By submitting a proposal to NASA, the investigator and his institution agree that NASA has the option to make a tentative selection pending a successful feasibility or definition study of the proposed investigation and, in addition, in case of investigations that are not entirely funded by NASA, upon confirmation of the availability of adequate financial support by the proposer's funding agency. Furthermore, NASA has the option to contract in phases for implementation of a proposed investigation and to discontinue the investigative effort at the completion of any phase.

The investigator should also understand that NASA may desire to select only a portion of the proposed investigation and/or that NASA may desire the individual's participation with other investigators in a joint investigation, in which case the investigator will be given the opportunity to accept or decline such partial acceptance or participation with other investigators prior to a NASA selection. Where joint participation with other investigators is agreed to, a single individual will be designated as the leader or contact point for the investigator group.

III. SELECTION WITHOUT DISCUSSION OR AFTER LIMITED DISCUSSION

The U.S. Government reserves the right to reject any or all proposals received in response to this Announcement when such action shall be considered in the best interest of the Government. Notice is also given of the possibility that any selection may be made without discussion or after limited discussion. It is, therefore, emphasized that all proposals should be submitted initially on the most favorable terms that the offeror can submit.

IV. FOREIGN PROPOSALS

Proposals for participation by individuals outside the U.S. should be submitted in the same format (excluding cost plans) as U.S. proposals. They must be typewritten and in English.

Foreign proposers must have their proposal reviewed and endorsed by an appropriate foreign governmental agency. Endorsed proposals should be forwarded to NASA to arrive before the Announcement deadline indicated. The endorsed copy of the proposal should be sent to NASA's Office of International Affairs (see address below) and should arrive before the deadline for the receipt of proposals.

The additional copies of the proposal should be sent directly to the Program Office specified in this Announcement of Opportunity. Sponsoring agencies may, in exceptional circumstances, forward advance copies of unendorsed proposals directly to the Program Office specified in this Announcement of Opportunity if review and endorsement are not possible before the specified deadline. In such cases, NASA should be advised when endorsement can be expected.

In cases where the participation of a U.S. individual is included in a PI/Instrument proposal submitted by a foreign individual and where it is anticipated that such participation will be supported by NASA, a Budget and Cost Plan covering such participation must be submitted to NASA as part of the Proposal. This Budget and Cost Plan must be signed by the U.S. individual and certified by the U.S. individual's institution. If it is more convenient to do so, such documentation may be mailed directly to the Program Office specified in the Announcement of Opportunity. Such costs will be considered in the review and evaluation of proposals submitted by foreign individuals.

Foreign individuals who plan to participate as Co-Investigators on a U.S. PI/Instrument proposal must have such participation reviewed and endorsed by their appropriate governmental agency before such participation can be selected. Evidence of such review and endorsement should be provided at the time that the proposal is submitted or as soon as possible

thereafter. Formal arrangements for such participation will be made by NASA's International Affairs Division after selection of the participation.

Notice of Intent to propose should be sent directly to the office designated in the Announcement with a copy sent to NASA's International Affairs Division. All other correspondence from foreign proposers and organizations should be sent to:

International Affairs Division
Code LID (A.O. No. CSSA-2-85)
National Aeronautics and Space Administration
Washington, DC 20546
U.S.A.

Foreign proposals will go through the same evaluation and selection process applied to proposals originating within the U.S. Should a foreign proposal be selected, NASA will arrange with the sponsoring foreign agency for the proposed participation on a no-exchange-of-funds basis, in which NASA and the sponsoring agency will each bear the cost of discharging its respective responsibilities, including travel and subsistence for its own personnel.

V. TREATMENT OF PROPOSAL DATA

The following will apply in the treatment of proposal data received in response to this Announcement.

A. COMMERCIAL AND FINANCIAL DATA

1. It is NASA's policy to use commercial and financial data included in proposals for evaluation purposes only. This policy does not require that this kind of proposal data bear the Notice described below.

2. Where it is the practice of an offeror or proposed subcontractor to treat certain commercial and financial data as a trade secret, and such data is protectible as a trade secret under law, that offeror may apply the Notice of paragraph (B) below to those portions to be maintained as a trade secret.

3. In any event, commercial and financial data submitted to NASA in a proposal will be protected to the extent permitted under the law, either as a properly noticed trade secret, or as commercial or financial information received from a person and considered confidential or privileged.

B. TECHNICAL DATA

It is NASA's policy to use the technical data contained in any proposal submitted in response to this Announcement for evaluation purposes only. Where any of such technical data constitutes a trade secret under the law and the proposer or his potential subcontractor desires to maintain trade secret rights in such technical data, the following Notice must be affixed to the cover sheet of the proposal specifying the pages of the proposal which contain trade secrets to be restricted in accordance with the conditions of the Notice. It is NASA policy to protect technical data labelled in this fashion as a trade secret. NASA assumes no liability for use or disclosure of any proposal technical data to which the Notice has not been applied.

NOTICE

Data on page(s) of this proposal constitute a trade secret. It is furnished to the Government in confidence with the understanding that it will not, without permission of the offeror, be used or disclosed other than for evaluation purposes. In the event a contract is awarded on this proposal, the Government may obtain, in the contract, additional rights to use and disclose this data.

VI. STATUS OF COST PROPOSALS (U.S. PROPOSALS ONLY)

The investigator's institution agrees that the cost proposal submitted in response to the Announcement is for proposal evaluation and selection purposes and that, following selection and during negotiations leading to a definitive contract, the institution will be required to resubmit or execute final cost as required by law and regulation. U.S. proposers may execute a DD Form 633 (Contract Pricing Proposal) to fulfill this requirement.

VII. LATE PROPOSALS

NASA reserves the right to consider proposals or proposal modifications received after the submission deadline, but prior to the date of selection, should such action be in the interest of the U.S. Government.

VIII. SOURCE OF SPACE TRANSPORTATION SYSTEM INVESTIGATIONS

Investigators are advised that candidate investigations for Space Transportation System (STS) missions can come from many sources. These sources include those selected through the Announcement of Opportunity, those generated by NASA in-house research and development, and those derived from contracts and other agreements between NASA and external entities.

IX. DISCLOSURE OF PROPOSALS OUTSIDE THE U.S. GOVERNMENT

NASA may find it necessary to obtain proposal evaluation assistance outside the U.S. Government. Where NASA determines it is necessary to disclose a proposal outside the Government for evaluation purposes, arrangements will be made with the evaluator for appropriate handling of the proposal information. Therefore, by submitting a proposal, the investigator and institution agree that NASA may have the proposal evaluated outside the Government. If the investigator or institution desire to preclude NASA from using an outside evaluation, the investigator or institution should so indicate on the cover. However, notice is given that if NASA is precluded from using outside evaluation, it may be unable to consider the proposal.

X. EQUAL OPPORTUNITY (U.S. PROPOSALS ONLY)

By submitting a proposal, the investigator and his institution agree to accept the following clause in any resulting contract:

EQUAL OPPORTUNITY (JUNE 1973)

During the performance of this contract, the Contractor agrees as follows:

(1) The Contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, or national origin. The Contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to their race, color, religion, sex, or national origin. Such action shall include, but not be limited to, the following: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoffs or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The Contractor agrees to post in

conspicuous places, available to employees and applicants for employment, notices to be provided by the Contracting Officer setting forth the provisions of this nondiscrimination clause.

(2) The Contractor will, in all solicitations or advertisements for employees placed by or on behalf of the Contractor, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, or national origin.

(3) The Contractor will send to each labor union or representative of workers with which the contractor has a collective bargaining agreement or other contract or understanding, a notice to be provided by the Agency Contracting Officer, advising the labor union or workers' representative of the Contractor's commitments under this nondiscrimination clause and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

(4) The Contractor will comply with all provisions of Executive Order 11246 of September 24, 1965, as amended by Executive Order 11375 of October 13, 1967, and of the rules, regulations, and relevant orders of the Secretary of Labor.

(5) The Contractor will furnish all information and reports required by Executive Order 11246 of September 24, 1965, as amended by Executive Order 11375 of October 13, 1967, and by the rules, regulations, and orders of the Secretary of Labor or pursuant thereto, and will permit access to the Contractor's books, records, and accounts by the contracting agency and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.

(6) In the event of the Contractor's noncompliance with the Equal Opportunity clause of this contract or with any of the said rules, regulations, or orders, this contract may be cancelled, terminated, or suspended, in whole or in part, and the Contractor may be declared ineligible for further Government contracts in accordance with procedures authorized in Executive Order 11246 of September 24, 1965, as amended by Executive Order 11375 of October 13, 1967, and such other sanctions may be imposed and remedies invoked as provided in Executive Order 11246 of September 24, 1965, as amended by Executive Order 11375 of October 13, 1967, or by rule, regulation, or order of the Secretary of Labor, or as otherwise provided by law.

(7) The Contractor will include the provisions of Paragraph (1) through (7) in every subcontract or purchase order unless exempted by rules, regulations, or orders of the Secretary of Labor issued pursuant to Section 204 of Executive Order 11246 of September 24, 1965, as amended by Executive Order 11375 of October 13, 1967, so that such provisions will be binding upon each subcontractor or vendor. The Contractor will take such action with respect to any subcontract or purchase order as the contracting agency may direct as a means of enforcing such provisions including sanctions for noncompliance: provided, however, that in the event the Contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by the contracting agency, the Contractor may request the United States to enter into such litigation to protect the interests of the United States.

XI. INVENTION AND DATA RIGHTS

The following will be applicable to any contract resulting from a selection under this Announcement:

(a) In instances where NASA totally or partially (cost shares) funds an investigation under a NASA contract, NASA is required by law to take title to inventions which may result from the work performed under the contract. The Contractor would be granted a royalty-free license to practice the invention. The Contractor, however, could petition for waiver of such title in accordance with NASA Patent Waiver Regulations 14 C.F.R. 1245.1, whereupon the Agency would give favorable consideration towards waiving title to the invention to the Contractor subject to the reservation by the Government of a royalty-free license. As a general rule, the contract provides that NASA and the Contractor can use and disclose, without restrictions, the data generated under the contract.

(b) In instances where a joint project is undertaken, i.e., the investigator furnishes the experiment without charge to NASA, and NASA accommodates the experiment on a flight without charge (no transfer of funds takes place), NASA will obtain a royalty-free license to practice for U.S. Governmental purposes any inventions resulting from the experiment, together with the right to use and disclose the resulting data for U.S. Governmental purposes.

XII. EXPERIMENT EQUIPMENT FLIGHTWORTHINESS

By submitting a proposal, the investigator's institution agrees that if their proposal involves provision of flight experiment equipment and is selected, it will be required to comply with the flight mission's flightworthiness requirements. This must be accomplished by the organization managing the acquisition of equipment. Flightworthiness requirements will be those to ensure necessary flight safety and those to ensure a reasonable probability of satisfactory mission performance of the experiment equipment (reliability and quality assurance). Investigators selected to provide experimental equipment will be advised of the pertinent flightworthiness requirements for the mission and experiment in a timely manner by NASA.

APPENDIX B

GUIDELINES FOR PROPOSAL PREPARATION

The following guidelines apply to the preparation of proposals by potential investigators in response to an Announcement of Opportunity. The material presented is merely a guide for the prospective proposer, and it is not intended to be all encompassing or directly applicable to the various types of proposals which can be submitted. The proposer should, however, provide information relative to those items applicable or as otherwise required by the Announcement of Opportunity. Specific procedures and details for each of the three types of proposals invited by this Announcement of Opportunity are described in Volume II of the Proposal Information Package.

A. COVER LETTER

A letter or cover page should be forwarded with the proposal. It should be signed by the investigator and an official by title of the investigator's organization who is authorized to commit the organization that is responsible for the proposal and its contents.

B. TABLE OF CONTENTS

The proposal, if not submitted on a form furnished by NASA, should contain a table of contents.

C. IDENTIFYING INFORMATION

The proposal should contain a short descriptive title for the investigation, the names of all investigators, and the name of the organization or institution. The full name of the Principal Investigator, address with zip code, and telephone number should be included.

I. INVESTIGATION AND TECHNICAL PLAN

A. INVESTIGATION AND TECHNICAL PLAN

The investigation and technical plan generally will contain the following:

1. Summary. A simple, concise statement about the investigation, its conduct, and the anticipated results.

2. Objectives and Significant Aspects. A brief definition of the objectives, their value, and their relationships to past, current, and future efforts. The history and basis for the proposal and a demonstration of the need for such an investigation. A statement of present development in the discipline field.

3. Investigation Approach.

- a. Fully describe the concept of the investigation.
- b. Detail the method and procedures for carrying out the investigation.

B. INSTRUMENTATION

This section should describe all information necessary to plan for experiment development, integration, ground operations, and flight operations. This section must be complete in itself without the need to request additional data. Failure to furnish and complete data may preclude evaluation of the proposal.

1. Instrument Description. This section should fully describe the instrumentation and indicate items which are proposed to be developed, as well as any existing instrumentation. Performance characteristics should be related to the experiment objectives as stated in the proposal.

2. Instrument Integration. This section should describe all parameters of the instrument pertinent to the accommodation of the instrument in the spacecraft. These include, but are not limited to: volumetric envelope; weight; power requirements; thermal requirements; telemetry requirements; sensitivity to or generation of contamination (e.g., electromagnetic interference, gaseous effluents); data processing requirements.

3. Ground Operations. This section should identify requirements for prelaunch or postlaunch ground operations support.

4. Flight Operations. This section should identify any requirements for flight operations support including mission planning. Operational constraints, viewing requirements, and pointing requirements should also be identified. Describe any special communications, tracking, or real-time ground support requirements and indicate any special equipment or skills required of ground personnel.

C. DATA REDUCTION AND ANALYSIS

A discussion of the data reduction and analysis plan including, insofar as possible, the method and format. A section of the plan should include a schedule for the submission of reduced data to the receiving point as specified in this Announcement of Opportunity.

II. MANAGEMENT PLAN AND COST PLAN

A. MANAGEMENT PLAN

The management plan should summarize the management approach and the facilities and equipment required. Additional guidelines applicable to non-U.S. proposers are contained herein.

1. Management

a. The management plan sets forth the investigator's approach for managing the work, the recognition of essential management functions, and the overall integration of these functions.

b. The management plan gives insight into the organization proposed for the work, including the internal operations and lines of authority with delegations, together with internal interfaces and relationships with NASA, major subcontractors, and associated investigators. Likewise, the management plan usually reflects various schedules necessary for the logical and timely pursuit of the work, accompanied by a description of the investigator's work plan and the responsibilities of the co-investigators.

c. The plan should describe the proposed method of instrument acquisition. Specifically, it should include the following, as applicable:

(1) Rationale for the investigator to obtain the instrument through or by the investigator's institution.

(2) Method and basis for the selection of the proposed instrument fabricator.

(3) Unique or proprietary capabilities of the instrument fabricator that are not available from any other source.

(4) Contributions or characteristics of the proposed fabricator's instrument that make it an inseparable part of the investigation.

(5) Availability of supporting personnel in the institution to successfully administer the instrument contract and technically monitor the fabrication.

(6) Status of development of the instrument, e.g., what additional development is needed. Areas that need further design or in which unknowns are present.

(7) Method by which the investigator proposes to:
(a) Prepare instrument specifications.
(b) Review development progress.

- (c) Review design and fabrication changes.
- (d) Participate in testing program.
- (e) Participate in final checkout and calibration.
- (f) Provide for integration of instrument.
- (g) Support the flight operations.
- (h) Coordinate with co-investigators, other related investigations, and the payload integrator.
- (i) Assure safety, reliability, and quality.

(8) Planned participation by small and/or minority business in any subcontracting for instrument fabrication or investigative support functions.

2. Facilities and Equipment

All major facilities, laboratory equipment, and ground-support equipment (GSE) (including those of the investigator's proposed contractors and those of NASA and other U.S. Government agencies) essential to the experiment in terms of its system and subsystems are to be indicated, distinguishing insofar as possible between those already in existence and those that will be developed in order to execute the investigation. The outline of new facilities and equipment should also indicate the lead time involved and the planned schedule for construction, modification, and/or acquisition of the facilities.

3. Additional Guidelines Applicable to Non-U.S. Proposers Only

The following guidelines are established for foreign responses to NASA's Announcements of Opportunity. Unless otherwise indicated in a specific announcement, these guidelines indicate the appropriate measures to be taken by foreign proposers, prospective foreign sponsoring agencies, and NASA, leading to the selection of a proposal and execution of appropriate arrangements. They include the following:

a. Where a Notice of Intent to propose is requested, prospective foreign proposers should write directly to the NASA official designated in the Announcement of Opportunity and send a copy of this letter to the International Affairs Division, Code LID, NASA Headquarters, Washington, DC 20546, U.S.A.

b. Unless otherwise indicated in the Announcement of Opportunity, proposals will be submitted in accordance with the NASA Guidelines for Proposal Preparation. Proposals should be typewritten and in English.

c. Persons planning to submit a proposal should arrange with an appropriate foreign governmental agency for a review and endorsement of the proposed activity. Such endorsement by a foreign organization indicates:

- 1) The proposal merits careful consideration by NASA.
- 2) If the proposal is selected, sufficient funds will be available to undertake the activity envisioned.

d. Proposals (along with the requested number of copies) and letters of endorsement from the foreign governmental agency should be forwarded to NASA in time to arrive before the deadline established for each Announcement of Opportunity. The endorsed original of the proposal should be sent to:

International Affairs Division
Code LID (Ref. AO No. OSSA-2-85)
National Aeronautics and Space Administration
Washington, DC 20546
U.S.A.

The additional copies of the proposal should be forwarded directly to the Program Office specified in the Announcement of Opportunity.

e. All proposals should be received before the established closing date; those received after the closing date will be treated in accordance with NASA's provisions for late proposals. Sponsoring foreign governmental agencies may, in exceptional situations, forward a proposal directly to the above address if review and endorsement is not possible before the announced closing date. In such cases, NASA should be advised when a decision on endorsement can be expected.

f. Shortly after the deadline for each Announcement of Opportunity, NASA's International Affairs Division will advise the appropriate sponsoring agency which proposals have been received and when the selection process should be completed. A copy of this acknowledgement will be provided to each proposer.

g. Successful and unsuccessful proposers will be contacted directly by the NASA Program Office coordinating the Announcement of Opportunity. Copies of these letters will be sent to the sponsoring governmental agency.

h. NASA's International Affairs Division will then begin making the necessary arrangements to provide for the selectee's participation in the appropriate NASA program. Depending on the nature and extent of the proposed cooperation, these arrangements may entail:

- (1) A letter of notification by NASA.
- (2) An exchange of letters between NASA and the sponsoring foreign governmental agency.
- (3) An agreement or Memorandum of Understanding between NASA and the sponsoring foreign governmental agency.

B. COST PLAN

The cost plan should summarize the total investigation cost by major categories of cost as well as by function.

1. The categories of cost should include the following:

a. Direct Labor. List by labor category, with labor-hours and rates for each. Provide actual salaries of all personnel and the percentage of time each individual will devote to the effort.

b. Overhead. Include indirect costs which, because of their incurrence for common or joint objectives, are not readily subject to treatment as a direct cost. Usually this is in the form of a percentage of the direct labor costs.

c. Materials. This should give the total cost of the bill of materials, including estimated cost of each major item. Include lead time of critical items.

d. Subcontracts. List those over \$25,000, specify the vendor and the basis for estimated costs. Include any baseline or supporting studies.

e. Special Equipment. Include a list of special equipment with lead and/or development time.

f. Travel. List estimated number of trips, destinations, duration, purpose, number of travelers, and anticipated dates.

g. Other Costs. Cost not covered elsewhere.

h. General and Administrative Expense. This includes the expenses of the institution's general and executive offices and other miscellaneous expenses related to the overall business.

i. Fee (if applicable).

2. Separate schedules, in the above format, should be attached to show total cost allocable to the following:

a. Principal Investigator and other Investigator's costs.

b. Instrument costs.

c. Integration costs.

d. Data reduction and analysis, including the amount and cost of computer time.

3. If the effort is sufficiently known and defined, a funding obligation plan should provide the proposed funding requirements of the investigations by quarter and/or annum keyed to the work schedule.

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